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ICT Skills and Computer Self-Efficacy of Research Students: The Case of Institute of Pure & Applied Biology and Biotechnology, Bahauddin Zakariya University, Multan, Pakistan

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Abstract

In the current changing higher education environment research students need to possess ample skills related to use of computer and different ICTs for education and research purposes. This study aims to investigate the awareness, usage and impact of information and communication technologies (ICTs) for information, education and research purposes among the Botany, Zoology and Biotechnology research students of Bahauddin Zakariya University, Multan. For this purpose, data was collected from students involved in research, in order to get information and awareness about their competencies and skills in ICT and other searching and data analyzing tools. The literature review shows that most research students have inadequate knowledge about many basic techniques of MS Office (Excel, Word etc), which are more

essential and useful for composing their theses. Majority of research students are not aware about using Endnote for preparing bibliographies and organizing citation and SPSS for data analyzing. They have also inadequate knowledge about HEC digital library. The study based upon information collected through a questionnaire containing both open and one close ended question. The collected data analyzed through SPSS 19. The study will endeavor to discover the problems faced by the respondents in accessing information communication technologies and online searching techniques. Recommendations would be included for maximum utilization of ICT by research students for education and research purposes and improving searching skills and to eradicate their problems in accessing e-resources and online searching.

Introduction

The importance of ICT to people generally and higher education students in particular cannot be overemphasized in the current changing higher education environment. The educative use of new emerging ICTs facilitates quick and easy access to a wide range of information/information resources globally. In fact, it is now not easy to visualize an information society without information technology.

This study is an effort to investigate that which type of situations is emerging with respect to the use of ICT in students involved in research. Many deficiencies are present in curriculum for introducing the new merging technologies and problem could be resolved through orientation courses(Littlejohn, 2002).Technological awareness is the base to sustain and utilizing and spread and exchange of intellectual work. (Concannon, Flynn, & Campbell, 2005) The students and teachers must have adequate training of ICT for proper use of technology (Galanouli & McNair, 2001). The study is an effort to know, how future developments can be predicted for further planning to develop ICT skills in those areas. This is the age of Information communication technology and it is requirement of each researcher to know all advance aspects of searching tools, manipulating and analyzing data through softwares and use of word processor with complete command on its functions.

Institute of Pure & Applied Biology and Biotechnology

Institute of Pure and applied Biology, Bahauddin Zakariya University, Multan was established in 1986. Departments of Botany, Zoology and Biotechnology are working under the umbrella of this Institute. Institute of Biotechnology started functioning in 2006 and currently offering BS-4 years, MSc., M.Phil and Ph,D level courses to its students all three departments.

Objectives of the Study

The main objective of this study is to explore current the level of knowledge and skills regarding computer and ICTs usage for educational and research purpose among the students of the Institute of Pure & Applied Biology and Biotechnology.

Research Questions

- To what extent do students from the Institute of Pure & Applied Biology and Biotechnology use different software, i for education and research?
- What is the present level of awareness, skills and purposes of Internet usage awareness of searching/browsing techniques properly and able to use advance level of searching and browsing techniques?
- What are the widely used HEC subscribed databases and search engines by respondents?
- Which software do they use for manipulation of data, i.e. SPSS, etc?
- What are the problems faced by the respondents in accessing e-resources and online searching and who do they consult in case of not finding them

Research Methodology

The present study is based on the results of a questionnaire. It was designed to assess the ICT skills and computer self sufficiency of Biological Sciences' students. A questionnaire was developed and a pilot study was conducted on 13 students. In the light of pilot study questionnaire was redesigned. Data were collected through a semi-structured questionnaire distributed among 73 students of these three departments with return response rate 73.97.

Literature Review

In a study, Khan, S., Bhatti, & Khan, A. (2011) recommended that teachers during lectures should make maximum use of ICT, because through this learning process become fast. Most of respondents use frequently internet but due to non availability of guidance they are unable to use advance searching techniques and facing difficulties in finding relevant literature. Due to unawareness of databases most of users used search engines and not open relevant databases. Most of the users are unaware about eBooks, open access books and journals. Computer labs facility is also insufficient and not fulfills the requirements of the users.

Majority of the respondents admitted that they use internet for study but they do not know about advance searching techniques. Like Ozoemelem (2009) this study also strongly recommends that students should be trained to use advance searching techniques for retrieving the material of their interests. Togia & Tsigilis (2010) in their study reported that the vast majority of the participants used Internet search engines rather than specialized databases and full-text resources. Findings of this study also reflect similar result. Result showed that the Google is the most used search engine by the respondents. The study found that the available PCs in computer labs are inadequate for meeting the needs of student and they feel problem in accessing computers. It is recommended that the number of PCs should be increased. It was also found that the students of education faculty do not know about the use of electronic books. It is highly recommended that they should be trained in using electronic books, journals and open access databases relevant to their field.

Adeniji, Adeniji, & Oguniyi (2011) explored that most of the respondents use ICT and aware about new technologies at the Olabisi Onabanjo University Libraries in Abeokuta, Nigeria. Poelmans, Truyen, & Stockman (2012) studies ICT awareness and attitude of students of higher education and observed that approximately relation about ICT skills in studied population is excellent. On the other hand gender and level of studies has minor difference in their ICT skills. Almerich (2011) through his research explained that teachers are more aware in use of ICT but required more specific training for use of different tools more efficiently. Collis (2002) pointed out that changes in use and awareness regarding ICT is very slow and it differ from country to country. Those countries that have clear mission are using ICT skills more frequently as compared to others.

Zare-ee (2010) studied the comparison of use of ICT in medical and non-medical institutions and found difference between both two readers. He described that this difference is due to availability of equipment and facilities provided in both types of institutions. Rahman (2011) reported that students have sufficient resources and have facilities both at residence for use of ICT and the requirement is improvement of ICT skill in students. Jadoon et al. (2011) indicated that many students have internet facility and they utilize it for both academic and entertainment purpose. But it was observed that these are not fully utilizing. Ned is that the awareness and abilities should be increased through creating awareness and training.

Khan & Bhatti (2012) described that libraries should create their websites and internet services provision may be made possible for every reader. Library professionals must be provided Internet, ICT and Social media usage training for prompt services to its readers. Library schools and professional associations should come forward for education and training of ICT and usage of social media

Data Analysis

Respondents' Gender

Table 1: Gender wise frequency

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
	Female	33	61.1	61.1	100.0
	Male	21	38.9	38.9	38.9
	Total	54	100.0	100.0	

Gender wise frequency: Female n=33 and male n=21

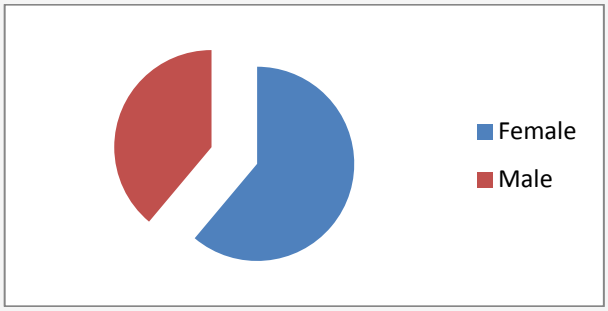

Fig.1. Gender wise frequency distribution

Respondents' Age

Table 2: Age level

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-25 Years	42	77.8	79.2	79.2
	26-35 Years	8	14.8	15.1	94.3
	36-40 Years	2	3.7	3.8	100.0
	31-35 Years	1	1.9	1.9	96.2
	Total	53	98.1	100.0	
Missing	System	1	1.9		
Total		54	100.0		

Most of the respondents n=42, were between the age of 20-25, the respondents n-8 are age of 26-30, respondents n=1 is between 31-35, and one respondent did not response to this question.

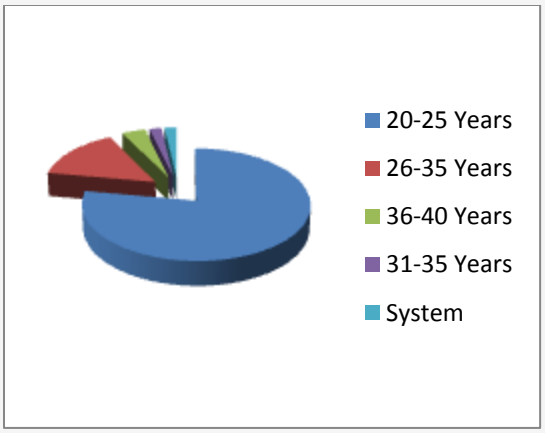

Fig. 2:Age

Knowledge and usage of computer

Table 3: **Statistical distribution of Knowledge and usage of computer by respondents**

Statistics				
	Mean	Median	Mode	Std. Deviation
MS Word	4.07	4	5	0.968
MS Power Point	3.26	3	3	1.247
MS Excel	3.15	3	3	1.139
MS Access	2.02	1	1	1.236
MS Outlook	1.57	1	1	1.002
MS Publisher	1.5	1	1	0.927

Scale: 5 Always, 4 frequently, 3 sometimes, 2 seldom, 1 never.

Using MS Word means 4.07 shows that most of the respondents frequently using, while MS Power Point and Excel means 3.26 and 3.15 shows sometimes they used, while MS Access, MS Outlook. And MS Publisher is seldom used by respondents and means are 2.02, 1.57 and 1.5 respectively.

Table 4: ***Different features of MS Word usage by respondents***

Statistics				
	Mean	Median	Mode	Std. Deviation
Use Heading commands to title and sub titles	3.76	4	5	1.243
Insert Table of Contents	3.65	4	3	1.2
Insert and Format Tables	3.54	3.5	3	1.111
Insert List of Tables	3.22	3	3	1.298
Insert List of Figures	3.04	3	3	1.243
Use search and replace command	2.65	3	1	1.532
Use page break option	2.61	2.5	1	1.379
Use Endnote with MS Word	2	1.5	1	1.182
Use section break option	1.98	1	1	1.189
Apply password for restriction on opening file	1.96	1	1	1.132
Apply password for restriction on editing	1.89	1	1	1.239
Attach articles in Endnote	1.83	1	1	1.077

Scale: 5 Always, 4 frequently, 3 sometimes, 2 seldom, 1 never.

Result shows that respondents are using Heading commands to titles and sub titles; Insert tables of contents, Insert and format tables frequently and their means are 3.76, 3.65, and 3.54 respectively. While could insert list of tables, list of figure, use search and replace command, and use page break option sometimes and their means are 3.22 and 3.04, 2.65 and 2.61 respectively. Respondents use seldom Endnote with MS word, Use Section Break option, Apply password for restriction on opening file, applying password for restriction on editing and attach articles in Endnote and their means are 2.00, 1.98, 1.96, 1.89, and 1.83 respectively.

Table 5: Usage of search engines

Statistics		
	N	
	Valid	Missing
Google	45	9
Yahoo	20	34
Mozila Firefox	20	34
Google Chrome	18	36
Alta Vista	13	41
Safari	3	51
Bing	2	52
Mexthon	1	53

Results shows in preference order that Most of the respondents like to use first Google, Second Yahoo, Third Mozila Firefox, Fourth Google Chrome, Fifth Alta Vista, Sixth Safari, Seventh Bing and on the last Mexthon.

Table 6: Google usage by the respondents

Statistics				
	Mean	Median	Mode	Std. Deviation
Simple Google	4.52	5	5	0.863
Google Scholar	3.48	4	4	1.342
Google Images	3.24	4	4	1.4
Google Books	3	3	3	1.289
Google Videos	2.5	2.5	1	1.255
Google Translate	2.41	2	1	1.325
Goolge News	2.28	2	1	1.28
Google analytics	1.85	1	1	1.106

Scale: 5 Always, 4 frequently, 3 sometimes, 2 seldom, 1 never.

Most of the respondents always use Simple Google and its mean is 4.52,, respondents sometimes use Google Scholar, Google images and Google books and Google Video and their means are 3.48, 3.24, 3.00, 2.5 respectively. Respondents use seldom Google translator and Google news and Google analytics and their means are 2.41, 2.28, and 1.85.

Table 8: Most used sources of information on internet

Statistics				
	Mean	Median	Mode	Std. Deviation
Open access articles	3.93	4	5	1.211
Open access books	3.7	4	5	1.283
Youtube information	3.26	3	5	1.494
Electronic journal	3	3	5	1.505
Slide Share	2.3	2	1	1.268
Electronic conference literature	2.15	2	1	1.139

Scale: 5 Most preferred, Preferred, 3 sometimes preferred, 2 Rarely Preferred, 1 never preferred

Most respondents frequently use open access articles and open access books their means are 3.93 and 3.7 respectively. Respondents search information from Youtube and Electronic Journals sometimes and their means are 3.26 and 3.0 respectively. Slide share and Electronic conference literature used seldom and means are 2.3 and 2.15 respectively.

Table 9: Level of searching

Statistics				
	Mean	Median	Mode	Std. Deviation
Direct write your title of research	4.44	5	5	0.945
Use subject heading	3.54	4	3[a]	1.111
Use keywords	3.44	4	4	1.223
Use basic search level	3.2	3	3	1.25
Use advance search level	3	3	3	1.289
Use phrases	2.8	3	3	1.294
Use Boolean operators	1.85	1	1	1.053

a. Multiple modes exist. The smallest value is shown

Scale: 5 Always, 4 frequently, 3 sometimes, 2 seldom, 1 never.

Mostly respondents frequently use and write direct title of research or sentence and use subject headings, the means are 4.44 and 3.54 respectively. Using keyword, using basic search level, using advance search level and using phrases are sometimes and mean 3.44, 3.2, 3.0 and 2.8 respectively. Using Boolean operators is seldom and its mean is 1.85.

Table 10: Usage of statistical tests for data analysis

Statistics				
	Mean	Median	Mode	Std. Deviation
Two way T test	2.37	2	1	1.496
Annova	2.28	1	1	1.472
Chi Sqare	2.28	1.5	1	1.497
One way T test	2.26	2	1	1.443
PASW (SPSS 19)	2.09	1	1	1.483
Manova	1.63	1	1	1.138

Scale: 5 Always, 4 frequently, 3 sometimes, 2 seldom, 1 never.

Two way T test, Anova, Chi Square, one way T test, PASW (SPSS19) and manova all are used seldom and means are 2.37, 2.28, 2.28, 2.26, 2.09, and 1.63 respectively.

Table 11: level of using facilities.

Statistics				
	Mean	Median	Mode	Std. Deviation
Wiki's	3.28	4	4	1.472
Book Marks	3.06	3	1	1.547
Favorites	2.5	2	1	1.599
RSS feeds	1.91	1	1	1.202

Scale: 5 Always, 4 frequently, 3 sometimes, 2 seldom, 1 never.

Respondents use Wiki's Book Marks Favorites sometimes and means are 3.28, 3.06, 2.5 respectively and an RSS feed is used sometimes and its mean is 1.91.

Table 12: Sites for searching of literature.

Statistics				
	Mean	Median	Mode	Std. Deviation
Using internet	4.57	5	5	0.86
Using HEC digital Library	2.69	3	1	1.451
Using email groups	2.41	2.5	1	1.237
Using HEC Ebrary	2.31	2	1	1.412
Using World Digital Library	2.24	1	1	1.504
Using Pakistan Research Repository	1.94	1	1	1.28
From CDROM DataBases	1.89	1	1	1.176

Scale: 5 Always, 4 frequently, 3 sometimes, 2 seldom, 1 never.

Searching for required literature, using internet respondents always use and its mean is 4.57, while use of HEC digital library is sometimes and mean is 2.69, and rest of all using email groups, Using HEC Ebrary, using world digital library, Using Pakistan Research Repository and from Cd Rom data bases are seldom and means are 2.41, 2.31, 2.24, 1.94, and 1.89 respectively.

Table 13: Subscription of Journals by respondents

Statistics					
		Frequency	Percent	Valid Percent	Cumulative Percent
	No	35	64.8	64.8	100.0
	Yes	19	35.2	35.2	35.2
	Total	54	100.0	100.0	

64.8 % Respondents never subscribed journals and 35.2 % are responds yes about subscription of Journals.

Table 14: usage of HEC subscribed databases

Statistics				
	Mean	Median	Mode	Std. Deviation
Science Online	2.76	3	1	1.589
Journals Online	2.74	2	1	1.604
Elsevier (Science Direct)	2.61	2	1	1.709
Springerlink	2.59	2	1	1.631
Willey - Blackwell Journals	2.2	1	1	1.571
Free Medical Journals	2.19	1	1	1.53
Mcgraw Hill Collections	2.04	1	1	1.3
American Association of Physics Teachers	1.96	1	1	1.578
Emerald	1.93	1	1	1.211
Nature Publishing	1.91	1	1	1.233
Royal Society	1.91	1	1	1.336
Cambridge University Press (CUP)	1.87	1	1	1.26
American Institure of Physics	1.85	1	1	1.393
World Bank E-Library	1.81	1	1	1.347
Institute of Physics	1.8	1	1	1.234
Jstor	1.78	1	1	1.269
Ebrary	1.72	1	1	1.204
American Chemical Society	1.67	1	1	1.332
Taylor and Francis Journals	1.67	1	1	1.082
American Mathematical Society	1.65	1	1	1.184
Edinburgh university Press	1.61	1	1	1.172
Association of Computing Machinery	1.57	1	1	1.109
ESDU - Engineering solutions for Academia	1.54	1	1	0.985
Project Muse	1.52	1	1	0.986
American Physical Society	1.43	1	1	0.924

Scale: 5 Always, 4 frequently, 3 sometimes, 2 seldom, 1 never.

Science Online, Journals Online, Elsevier (Science Direct), and Springerlink used by readers sometimes and means are 2.76, 2.74, 2.61 and 2.59 respectively. Willey - Blackwell Journals, Free Medical Journals, McGraw Hill Collections, American Association of Physics Teachers, Emerald, Nature Publishing, Royal Society, Cambridge University Press (CUP), American Institute of Physics, World Bank E-Library, Institute of Physics, Jstore, Ebrary, American Chemical Society, Taylor and Francis Journals, American Mathematical Society, Edinburgh university Press, Association of Computing Machinery, ESDU - Engineering solutions for Academia, Project Muse and means are 2.2, 2.19, 2.04, 1.96, 1.93, 1.91, 1.91, 1.87, 1.85, 1.81, 1.8, 1.78, 1.72, 1.67, 1.67, 1.65, 1.61, 1.57, 1.54, and 1.52, respectively and American Physical Society is near to never and mean is 1.43.

Table 15: Problems faced during search

Statistics				
	Mean	Median	Mode	Std. Deviation
File not opening	2.94	3	3	1.071
Relevant literature is not found	2.63	3	3	1.104
Problem of file conversion e.g. PDF to word	2.63	2.5	2	1.202
Citation not copied	2.44	2	3	1.144
Searching of bibliographic information through online data bases is difficult	2.37	2	1[a]	1.154
File not attaching in bibliographical Software e.g. Endnote	2.13	2	1[a]	1.029

Scale: 5 Always, 4 frequently, 3 sometimes, 2 seldom, 1 never.

Respondents sometimes faced problem of file not opening, relevant literature is not found and problem of file conversion, e.g., PDF to MS Word and their means are 2.94, 2.63, and 2.63 respectively, while facing problems seldom are citation not copied, searching of bibliographic information through online data bases and file not attaching in bibliographical software, e.g,. Endnote are 2.44, 2.37, and 2.13 respectively.

Table 16: Consultancy in case of facing problems in using ICT

Statistics				
	Mean	Median	Mode	Std. Deviation
Your class fellows	3.24	3.00	5	1.440
Your Supervisors	3	3	4	1.479
Teachers of Department	2.93	3	1	1.612
Seniors	2.87	3	1[a]	1.388
IT expert	2.54	2	1	1.463
Your Librarians	2.07	1.5	1	1.242
Teachers of other Department	2.04	2	1	1.197

a. Multiple modes exist. The smallest value is shown

Scale: 5 Always, 4 frequently, 3 sometimes, 2 seldom, 1 never.

Respondents consult in case of facing problems seldom with their class fellows, their supervisors, their teachers of the department, seniors and IT experts and their means are 3.24, 3.00, 2.93, 2.87 and 2.54 respectively. While they seldom consult with their Librarian and teachers of others departments and their means are 2.07 and 2.04 respectively.

Suggestions by the Respondents

In response to open ended question only eight respondents gave comments and they have the view that it is a good effort to collect such type of information and in the light of these suggestions; steps for improvements should be taken. Respondents also facing internet problems and required more internet labs and speed of internet should also be increased. More e resources for each subject are needed. There should be some IT experts who should provide guidance to the readers. Latest books and journals should be added in libraries to fulfill the requirements of readers.

Findings

The study shows that most of the students were female and most fall in the age group of 20-25 years. Most of the respondents are frequently using MS Word, use MS Power Point and Excel sometimes and Access, Outlook used seldom while they never used Publisher. Respondents were aware and frequently used commands of Headings of titles and subtitles, insert table of contents, insert and format tables and they sometimes use commands of insert lists of tables , insert list of figures, use search, replace command and use page break option. They seldom use Endnote with MS word, use section break option, applying password for restriction on opening file and editing file and attach articles in Endnote. Most of respondents use Google search engines and others search engines usage is less and yahoo, Mozilla Firefox, Google Chrome, Alta Vista, Safari and Bing usage is becoming less and less respectively. In using Google, they use Simple Google frequently, while usage of Google Scholar, Google images, Google Books and Google Videos are used sometimes. The usage of Google translates, News, and analytics is seldom. The purpose of using internet they frequently use for searching of research articles, email, getting general information and entertainment. Usage for the purpose of social media, getting religious information and chatting is sometimes. Respondents frequently use open access Journals and books and use sometimes YouTube and electronic journals while use seldom slide share and electronic conference literature. While searching literature respondents always use direct title statement and subject headings, sometimes use keywords, basic search, advanced search and phrases, and seldom use Boolean operators. For data analyzing seldom use two way T test, Anova, Chi square, One way T test, SPSS and Manova. Respondents sometimes use Wiki's, Book Marks and Favorites while seldom use RSS feeds. For literature search, respondents always use internet general search, sometimes use HEC digital library, and seldom use email groups, HEC Ebrary, World Digital Library, Pakistan Research Repository and CD ROM databases. 64.8 % of respondents never subscribed journals. In response to using HEC databases, the data shows that respondents sometimes use Science Online, Journals online, Elesvier(Science Direct) and Springerlink, while all others Willey - Blackwell Journals, Free Medical Journals, McGraw Hill Collections, American Association of Physics Teachers, Emerald, Nature Publishing, Royal Society, Cambridge University Press (CUP), American Institute of Physics, World Bank E-Library, Institute of Physics, Jstore, Ebrary, American Chemical Society, Taylor and Francis Journals, American Mathematical Society, Edinburgh university Press, Association of Computing Machinery, ESDU - Engineering solutions for Academia, Project Muse are seldom used, and American Physical Society is never used by them. Respondents sometimes face problem file not opening, relevant literature is not found, and file conversion from PDF to word. While seldom faced problem of citation not copied, searching of bibliographical information through online databases id difficult and file not attaching in bibliographical softwares e.g. Endnote. Respondents consult in case of facing problems seldom with their class fellows, their supervisors, and their teachers of the department, seniors and IT experts, while they seldom consult with their Librarian and teachers of others departments.

Conclusion and Recommendations

Results shows that students use MS word frequently and MS Power Point and Excel sometimes, it is sign that their focus on only on MS Word for writing and composing assignments and theses. They could use only few commands which are necessary and commonly required for routine tasks. Most of the respondents use Google and it is seemed that they feel that Google is only search engine which could resolve their searching problems and most of them use only simple Google and not aware about other Google products for searching of literature. Use of internet is for searching of literature/research articles which is a good sign. Respondents most thrust is upon Open access articles and books and the reason may be high costs of journals and mode of payments of these journals. It is also seemed that respondents are not aware of searching techniques and they search required literature through writing complete sentence of required material. Respondents behavior regarding statistical analysis of data is not up to the marks

which shows that no one has provided awareness/ guidance about use of these statistical analysis tools/methods. Use of Wikis, book mark is also very low. Respondents have less information about HEC databases and how to use email groups for getting information, and other sources. Rate of subscription of journals level is also very low, which may be due to low purchasing power and also due to less awareness about how to subscribe journals. Use of HEC subscribed data bases is also very low and it shows that awareness about these databases has not been providing to the research students. It is astonishing that respondents have low problems for searching and browsing, file downloading, conversion of file in different formats and it may be due to less use of searching research articles. Respondents reported that they are not getting help from their librarian in resolving problems in use of ICT may be due to inadequate knowledge and skills by LIS professionals.

Recommendations

- At the beginning of each academic session, the university library should offer introductory lectures about IT skills should be organized
- Orientation courses/workshops regarding searching techniques and tools should be conducted from time to time.
- Continuous surveys for assessing users' information needs and information seeking behavior should be conducted.
- Some IT expert or other IT literate person should must be deputed for providing guidance and awareness in the labs.
- Internet speed problem may be resolved and the prompt services upto 24 hours from servers may be made possible.
- University library should provide digital literacy to students in using electronic books, journals and open access databases relevant to their field.
- In HEC databases most of the articles are not free of cost and many of journals not providing full access, authorities need to give serious attention to this issue.

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